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NORTH AMERICAN REVIEW.

No. CCCCLVI.

NOVEMBER, 1894.

THE FIGHT OFF THE YALU RIVER.

BY THE HON. HILARY A. HERBERT, SECRETARY OF THE
NAVY.

ELEVEN years ago the United States began building a new navy to take the place of its old that was fast passing away. The progress made has attracted the attention of the world.

We have now, completed and nearing completion, a number of gunboats, cruisers, and monitors, and, also nearing completion, two second-rate and four first-rate battle-ships. We have only two torpedo-boats. Three more were recently authorized and are about to be laid down, but five boats of this class are totally insufficient even for our present fleet.

Congress was strongly urged by the Navy Department at its last session to authorize additional battle-ships and torpedo-boats, and it is believed that public sentiment approves the recommendation. All the works necessary for the carrying out of this programme are in full operation, and such vessels, if now authorized, could be built, armor and armament included, with promptness and dispatch.

Is there anything in the recent naval developments to justify the conclusion that the days of the battle-ship are ended ?

Judging from what we see in the newspapers the fight off the Yalu seems to have created a somewhat widespread impression that they are, and that the naval battles of the future are to be

won by swift unarmored cruisers, armed with powerful guns and fighting at long range.

The Japanese have undoubtedly illustrated afresh the value of sea power. This of course has been taught, time and time again, in lessons familiar to all. The most powerful factor in the downfall of Napoleon, one that operated all the time from 1805 to 1814, was the absolute control of the sea by his arch-enemy, England. He was shut off from transportation by sea, compelled to rely on land communications, and there was no point in the circle of his conquests from the easternmost shores of Italy along the coasts of the Mediterranean to Gibraltar, and thence around the Atlantic and the Channel and the North Sea into the Baltic, where the English could not assail him. The genius of the great conqueror and the wonderful impulse the revolution had given to his soldiery made him master of continental Europe, but he could not hold it. Wherever upon the sea there was a strategic point in his conquered territory there were English fleets, English diplomacy, and English allies, and these finally led first to the downfall at Paris and then to Waterloo.

A more recent, possibly a more forceful, lesson is to be drawn from our own civil war. The Union fleets blockaded the Confederacy and almost starved it to death. They shut it in from recruits and supplies and munitions of war. They cut it in two by their fleets on the Mississippi, and penetrated its vitals along the lines of other navigable streams. They hovered around it, as England hovered around Napoleon and his satrapies, and assailed it wherever it was weakest. When the true history of the conquest of the Confederacy is written it will undoubtedly appear that, in proportion to numbers engaged and expenses incurred, the navy of the United States was a far more efficient factor in the final result than even the armies in the field.

Japan is illustrating the same lesson. By her command of the sea, she outnumbered the Chinese at Ping Yang, and by the battle off the Yalu she seems now, at this writing (Oct. 10), to have acquired such further dominion over the water as to justify her, in the opinion of her Emperor, in landing troops on Chinese soil, and undertaking an invasion. The value of sea power is not, however, the topic this paper is intended to discuss. It is believed that a vast majority of the American people recognize the

fact that the United States ought to have more power on the sea than is represented by her present navy.

The question of present interest is, When we add to our navy shall we build battle-ships?

In deciding upon vessels of war we are to keep steadily in view the purposes for which they are to be used. Strategy is the "art of determining upon the decisive points in the seat of war, and the lines along which forces must move to reach them." Successful strategy requires swift movement and often over great distances. We must therefore consider in building ships not only their powers of offence and defence, but also their radii of action and speed. When a decisive point in the seat of war has been determined upon, the rapidity with which fleets can be concentrated upon it becomes all important. General Bedford Forrest, the celebrated Confederate cavalryman, when asked what he considered the secret of success in war, answered pithily, "To get there first with the most men."

If unarmored cruisers, when they "get there," can successfully engage battle-ships, then, as their speed is greater and their radii of action by reason of increased coal capacity is also greater, they should undoubtedly be preferred. Not only would they cost less, but they would be of incalculably greater value for purposes of war. Is the news, as we have it now from the Yalu, sufficient to cause us to conclude that an unarmored vessel, having gotten to the battle-ground, can contend against an armored ship?

It is admitted that for a complete understanding of the lessons of this exceedingly interesting fight, much fuller details are necessary than any now at hand, and it certainly is not the purpose of this article to attempt the impossible task of laying down final conclusions about the teachings of a battle, the knowledge of which is as yet so imperfect. The only purpose of this paper is to contend that what seems to be a largely prevalent present impression is not justified by any information now at hand. Certain postulates will also be suggested, which it will be well to bear in mind when we come to reason with the facts more fully before us, for it is believed to be in the highest degree improbable that anything ever can be learned from Yalu that will put an end to the building of heavily armored vessels.

The battle-ship of to-day is not the creature of yesterday. It did not, with its armor, its engines, its guns, its torpedoes, and

its ram, grow up in a night, like Jonah's gourd. On the contrary it is the evolution of ages. It is true that it is sometimes called, even by naval experts, an experiment. This is for the reason that, as an organized entity, it has never been tested in battle. But such a statement, though it be in itself strictly correct, is nevertheless likely to lead to erroneous conclusions, as there is no important factor generally used in modern battle-ships that was not, before its adoption, thoroughly discussed, *pro* and *con*, by the very brightest intellects that could be brought to bear upon it. These discussions have been enlightened by every physical test, including firing at plates, that could be devised, save only that the completed ship has not been fired at. Nor was this test applied at the Yalu. There was no first-class modern battle-ship there. If there was not, as will hereafter be shown, it is not easy to see how anything can possibly come out of that fight to disturb the general conclusions embodied in such a vessel by the common consent of naval experts after so much and such prolonged study and experiment.

The mind of the naval architect is naturally conservative.

*" Illi robur, et aes triplex
Circa pectus erat, qui fragilem truci
Commisit pelago ratem
Primus."*

A dread of the great deep seems natural to the human mind, and few have been so prone to caution and so slow to adopt innovations as the architect who builds the ships that are to encounter the dangers of the sea and of battle. It is astonishing how slowly, until of recent years, the art of shipbuilding has advanced ; how much the barge in which Cleopatra sailed down the Cydnus to welcome Antony was like a modern yacht, and how similar the lines of the vessels with which the Greeks fought the Persians at Salamis, the Christians fought the Turks at Lepanto, and the English fought the French and Spanish at Trafalgar were to the lines of the warships of to-day. The changes the centuries have wrought in ships have been not essentially in shape, but in size, in motive power, in armament, and lastly in material. From the earliest times there has been unceasing effort to improve naval methods, and though warships have always in some sense measured the civilization of nations, yet the art of the shipbuilder has been, certainly until recently, a laggard in the progress of the world.

The Greeks had at Salamis better vessels than the Persians. The people who led the world in painting, sculpture, and architecture were better shipwrights and better workers in metals than the barbarian invaders, and the Grecian galleys had therefore stronger prows with which to ram an enemy, and their soldiers had better swords and shields and spears. These, with the courage and superior tactical skill of the Greeks, gave them victory over the superior numbers of the Persians, but the Persians and the Greeks both propelled their boats by oars. The galley period of naval warfare lasted until the 14th century was well under way.

Then came in the gun upon the vessel propelled by sail,—the gun to stay indefinitely, perhaps as long as naval warfare shall last upon the earth, and the sailing man-of-war to float its flag in triumph over the seas for four centuries.

The varieties of sailing men-of-war were infinite. So it had been with the galley, and though it always appeared that swift galleys and light swift sailing-ships had their uses and were indispensable to war fleets, yet experience has shown, in every period of naval warfare, and under all conditions, not only that boats and ships that were relatively strongest and best built were superior in battle, but that upon such superiority in battle, and not upon swiftness of movement, depends dominion over the sea. So it was at Salamis ; so it was subsequently, when the Romans drove the Carthaginians from the sea ; so it was with the powerful galleys which contributed so greatly to the victory of the Christian allies over the Turks at Lepanto ; and the careful student of the war of 1812 will find that the many triumphs in naval duels won by the Americans were due in no small degree to the excellence of our ships and their armament.

Not only has experience taught that the best stand strongest ships, other things being equal, must win in single combat, but it has shown that successful battles must be fought by ships in line or other definite and methodical formation. Ships fighting without coöperation, or coöperating in confused masses without system or order, cannot hope for success against well-directed, systematic lines. Not only is some line of battle a necessity, but it is equally a necessity that a line of battle should be if possible composed of line-of-battle ships. Nelson put behind him at Trafalgar his weaker vessels, and so it

must always be. No fleet commander who can avoid it will expose his line to be broken by opposing a weaker to a stronger ship. Naval authorities, it is believed, agree without exception that these principles must obtain throughout all naval warfare, whatever may be the changes in the nature of ships or in the range of weapons, and therefore naval architects, during this century, full of so many startling developments, have been watching intently every discovery that could throw light upon the question what a naval vessel should be that is to hold its place in line in the day of battle. That it is to be propelled by steam, which has finally driven out sail power ; that it is to be seaworthy and habitable, and capable of steaming to the points where it is likely to be needed with as much rapidity as is consistent with the other functions required of it; and that it is to combine in itself as much power offensive and defensive as may be—all experts seem agreed.

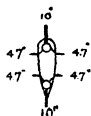
The gun after it got upon the ship advanced as slowly as the ship. The battles of the civil war in America thirty years ago were fought out with cast-metal, muzzle-loading guns, and cast-metal, muzzle-loading guns had been used for four centuries. Breech-loading small arms were in 1861 in their infancy, and wrought iron had only four years before begun to be associated with ordnance. The Parrott gun, with a heavy band of wrought iron around its breech, was the precursor of the modern built-up steel gun.

Iron, before our civil war, had begun to be used in shipbuilding. The U. S. S. "*Michigan*," still representing the government on the Lakes, was built of iron in 1844, but so conservative was naval architecture that sixteen years afterward there were very few iron vessels afloat. The Emperor Napoleon, in 1861, had put three and four inches of iron on the sides of a war vessel, and theorists were discussing plans of heavy armor for battle-ships when the destruction of the "*Cumberland*" and the "*Congress*" by the "*Merrimac*," and then the fight between the "*Merrimac*" and the "*Monitor*," startled the world. The one was an object-lesson proving that certainly at that time unarmored vessels could not fight armored ships ; the other seemed to show that the plain iron armor of that day was superior to the gun. The shipyards and foundries of Europe went to work to build new navies. The gunmakers set about devising new guns and inventing new powder and new projectiles with which to pierce this armor.

Guns grew stronger and longer, and powder was made slow-burning, thus enabling larger charges to be used; and projectiles, in order that they shall not go to pieces on the armor, have come to be made of highly tempered steel. These improvements in guns and projectiles have been met by constant improvements in armor, which is now made of steel, toughened by an admixture of nickel and hardened by new processes.

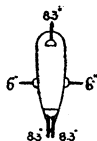
This contest between the power of the gun to pierce, and the power of armor to resist, has gone on year after year. At one time it is proclaimed that armor has won, at another that the gun is master. The contest is not even yet at an end. The impression is gaining ground, however, that the gun has thus far the advantage; that is to say, that no armor a ship can carry, in extent sufficient to protect all her vital parts, can resist a point-blank blow from the highest-powered gun a ship can carry. Even if it be admitted that this is true now to the fullest extent, and further that it is to be thus for all time, still it does not follow that armor is to be abandoned, and that the unarmored vessel carrying heavy guns is to be the battle-ship of the future. It still remains to be said for the armor, as against the high-powered gun, that the gun that will pierce an armor plate at point-blank range on the proving-ground with unerring certainty, cannot be counted on to achieve the same result in the ever-varying conditions of battle, as the target is moving and shifting, and the angle at which the blow will be given will be largely a matter of accident. But omitting this consideration, and admitting even that armor would be no protection against very heavy guns, still the argument does not stop. The best ship can carry only a few of these, and their fire is necessarily slow. There remains to be encountered the terrible hailstorm of projectiles coming from rapid-fire guns and machine guns, and even from modern muskets, which could pierce the sides of an unarmored cruiser at the distance perhaps of half a mile. The improvement in guns of small calibre, in the range and rapidity of fire of 4, 5, and 6-inch guns, has been quite as marked as in heavy ordnance. A 5-inch gun, with a range of five miles, can deliver fifteen shots, while the 12-inch fires once,—the one firing at the rate of five shots per minute, the other at the rate of one shot in three minutes. A 4-inch gun, with a range of four miles, can fire eight aimed shots per minute, or twenty-four shots while a 12-inch gun fires once.

COMPARISON BATTLE OFF

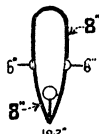


NAME. CHAD YUNG
CLASS. GUN VESSEL
DISPLACEMENT. 1350.

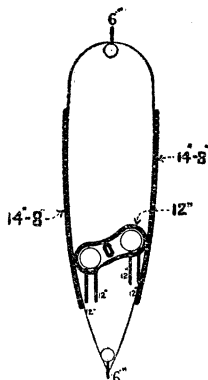
SUNK.



CHING YUEN
PROTECTED CRUISER
2300.



PING YUEN
COAST DEFENSE VESSEL
2600.



CHEN YUEN
BATTLE SHIP
7430.



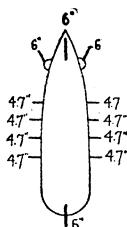
LAI YI
COAST DEF
290

CHI

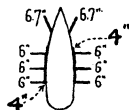


NAME. AKAGI
CLASS. GUN VESSEL
DISPLACEMENT. 614.

INJURED.

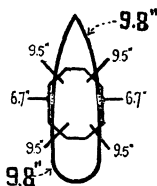


YOSHINO
PROTECTED CRUISER
4150.

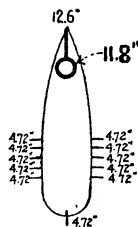


HIYEI
ARMORED CRUISER
2250.

INJURED.



FUSO
ARMORED CRUISER
3710.

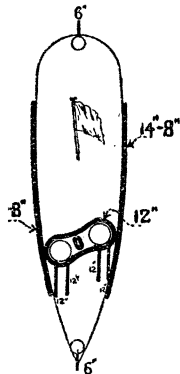


ITSUKUSHIMA
COAST DEFENSE VESSEL
4280.

JAF

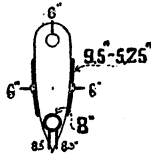
ESSELS ENGAGED VER, SEPT.17,1894.

TORPEDO BOATS



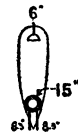
TING YUEN
BATTLE SHIP
7430.

INJURED.

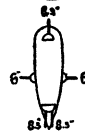


KING YUEN
COAST DEFENSE VESSEL
2900.

SUNK.

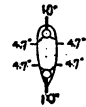


CHI YUEN
COAST DEFENSE VESSEL
2355.



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PROTECTED CRUISER
2300

SUNK.



YUNG WEI
GUN VESSEL
1350

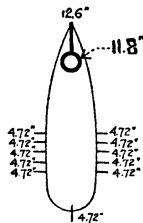
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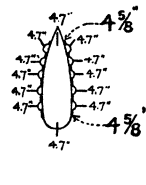


IJIMA
GUN VESSEL
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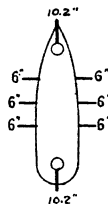
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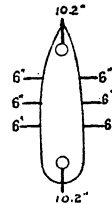
HASIDATEM
COAST DEFENSE VESSEL
4280.



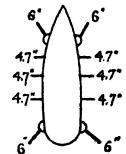
CHIYODA
ARMORED CRUISER
2250



NANIWA
PROTECTED CRUISER
3650.



TAKACHIHO
PROTECTED CRUISER
3650



AKITSUSHIMA
PROTECTED CRUISER
3150.

E FLEET.

A Hotchkiss revolving cannon, throwing a six-pound projectile accurately for three miles, will deliver its fire at the rate of twelve per minute, or thirty-six times as rapidly as the 12-inch gun.

Any one of these projectiles, whether from a rapid-fire, five-inch, or four-inch gun, or from a Hotchkiss gun, would pierce an unarmored cruiser through and through anywhere, certainly above its protective deck, and any one of such shots delivered into the complicated gun-mount of a ten or twelve inch gun would put the gun out of action. The storm of projectiles that would be rained upon a ship in battle from "secondary batteries," composed of these rapid-fire and revolving guns, carried by all well-armed ships, whether armored or unarmored, would be turned off from the best modern armor wherever it should strike it, as were the projectiles of the "Merrimac" from the tower of the "Monitor," whereas these same shots would, if they should strike its guns or gun-mounts, almost immediately disable the great guns of an unarmored vessel.

The effectiveness of modern ordnance is not matter of conjecture. At what is called the battle—or it should be more properly termed the massacre—of Min River in 1884, the French fleet, composed of eight vessels, annihilated within fifteen minutes eleven Chinese vessels which had no efficient protecting armor. It is true that the Chinese vessels and guns were awkwardly handled, that many of their pieces could not be brought into action, but the incident shows conclusively how terribly destructive is the accumulated energy of modern rapid-fire guns. Gordon's machine guns in the Soudan were so destructive that the Soudanese were absolutely unable to work their pieces. If it be true, then, that modern armor would successfully resist projectiles from these guns—and repeated experiments seem to leave no doubt that it is—then the armor must be worth its cost that would defend against them. It would be a large cruiser that would carry three guns that could be relied upon to pierce the armor of a battle-ship. These could deliver, say, one shot per minute. The armored vessel, besides its great guns, would be able to deliver from its secondary batteries, say, fifty shots per minute, any one of which, striking the complicated and unprotected machinery with which the great guns of a cruiser are loaded and worked, would disable them instantly. It would

seem to be desperation to put into the line of battle a ship at such a disadvantage. Indeed a careful consideration of the destructiveness of machine-gun fire would tend to the conclusion that the future, instead of seeing battle-ships built without armor, will see all cruisers protected, at least with light armor like that upon the "New York." If it comes to be admitted on all hands that armor will protect against all but the heaviest guns, it will be then, in a fight between two battle-ships, a question of give and take, just as it was in former times, say, between the "Constitution" and the "Guerrière."

Still another almost incalculable advantage in favor of the battle-ship is its greater stability and steadiness as a gun platform. The advocates of the unarmored cruiser as a fighting-ship, if there are any among experts, would, while distributing most of it in additional coal and motive machinery, insist upon putting some at least, of the weight the battle-ship is made to carry in armor, into additional heavy guns. These guns, though they should be fairly distributed along the deck, must be at a considerable elevation above the water, and so would make the ship top-heavy and uneasy in the water during the shock of battle. The battle-ship, on the other hand, having its heavy armor, much of it, on its sides and extending well down into the water, becomes the steadiest gun platform that can be floated. The charge of a 12-inch gun weighs nearly 1,300 pounds. Only about sixty of them per gun are carried; this and the time required in firing, not to speak of economy, which is not to be thought of in the supreme moment of battle, all alike proclaim the importance of accuracy in firing these guns. To hit or to miss with one of these shots may be to win or to lose a battle upon which empire depends.

Our actual knowledge about the battle of the Yalu and its results is at the present writing lamentably meagre. When we know what ships were engaged on both sides, we know enough to say with confidence that it does not show that an unarmored cruiser can successfully encounter a battle-ship. The material for the experiment was not present.

Comparing all the accounts, it is safe to say that both sides fought bravely, that the results favored the Japanese, as the Chinese suffered much greater loss of life and lost four vessels, while the Japanese are believed to have had probably three ships severely injured. The battle seems to have been fought at long range,

CHINESE SHIPS ENGAGED IN THE ACTION OFF THE YALU RIVER.

| Name. | Class. | Displacement, tons. | I. H. P. | Batteries. | | Torp. tubes. | Armor. | | | Max. speed. knots. | Remarks. |
|---------------|-----------------------------|------------------------|----------|---|----------------------------------|--------------|-------------------------------|------------------|----------------------|--------------------------|---------------------------|
| | | | | No. and class of guns. | Total wt. of fire, lbs. | | Hull. | Battery. | Deck. | | |
| Chen Yuen... | Battle-ship | 7,430 | 7,300 | { IV. 12.0" B. L. II. 6.0" B. L. | 3,126 | 3 | { Belt, Partial, 8-14" | Barbette, 19" | 2-3" | 15.5 | Completed 1883, Germany. |
| Ting Yuen... | Battle-ship | 7,430 | 7,200 | { IV. 12.0" B. L. II. 6.0" B. L. | 3,126 | 3 | { Belt, Partial, 8-14" | Barbette, 12" | 2-3" | 15.4 | " 1883, " |
| King Yuen... | { Coast de- fence vessel | 2,900 | 5,000 | { III. 8.3" B. L. II. 6.0" B. L. | 954 | 4 | { Belt, Partial, 5.25-9.5" | ..... | ..... | 15.0 | " 1887, " |
| Lai Yuen..... | { Coast de- fence vessel | 2,900 | 5,000 | { III. 8.3" B. L. II. 6.0" B. L. | 954 | 4 | { Belt, Partial, 5.25-9.5" | ..... | ..... | 15.0 | " 1887, " |
| Ping Yuen.... | { Coast de- fence vessel | 2,600 | 2,400 | { I. 10.3" B. L. II. 6.0" B. L. | 637 | 4 | { (Belt) 8" | Turret, 5" | 2" | 10.5 | " 1890, Fuchau, China. |
| Chi Yuen. ... | { Coast de- fence vessel | 2,355 | 2,800 | { II. 8.3" B. L. I. 6.0" B. L. | 730 | 4 | ..... | Barbette, 15" | 1.5-3"/17.5 | Completed 1884, Germany. | |
| Chih Yuen.... | { Protected cruiser | 2,300 | 6,000 | { III. 8.3" B. L. II. 6.0" B. L. | 1,124 | 4 | ..... | ..... | 2-4" | 18.5 | " 1887, England. |
| Ching Yuen... | { Protected cruiser | 2,300 | 6,000 | { III. 8.3" B. L. II. 6.0" B. L. | 1,124 | 4 | ..... | ..... | 2-4" | 18.5 | " 1887, " |
| Yang Wei. ... | Gun vessel | 1,350 | 2,800 | { II. 10.0" B. L. IV. 4.7" B. L. | 1,180 | 3 | ..... | ..... | Partial 16.2 | " | " 1881, " |
| Chao Yung... | Gun vessel | 1,350 | 2,800 | { II. 10.0" B. L. IV. 4.7" B. L. | 1,180 | 3 | ..... | ..... | Partial 16.2 2-5" | " | " 1881, " |
| Total, 10... | | 32,915 | 47,300 | 12.0" = 8 10.3" = 1 10.0" = 4 8.3" = 12 6.0" = 17 4.7" = 8 Total = 50 | 14,135 | 36 | | | | | |

JAPANESE SHIPS ENGAGED IN THE ACTION OFF THE YALU RIVER.

| Name. | Displacement, tons. | Class. | I. H. P. | Batteries. | | Torp. tubes. | Armor. | | | Max. speed, knots. | Remarks. |
|----------------|------------------------|---------------------------|----------|---|----------------------------------|--------------|-----------------------|------------------------------|-----------------------|-----------------------|--------------------------|
| | | | | No. and class of guns. | Total wt. of fire, lbs. | | Hull. | Battery. | Deck. | | |
| Matsushima... | 4,277 | Coast de- fence vessel | 5,400 | I. 12.6" B. L. R. XII. 4.72" R. F. | 1,416 | 4 | ..... | Barbette turret, 11.8" | 1.5-2" | 16.0 | Completed, 1891, France. |
| Isukushima... | 4,277 | Coast de- fence vessel | 5,400 | I. 12.6" B. L. R. XI. 4.72" R. F. | 1,370 | 4 | ..... | Barbette turret, 11.8" | 1.5-2" | 16.8 | " " |
| Hasidate..... | 4,277 | Coast de- fence vessel | 5,400 | I. 12.6" B. L. R. XI. 4.72" R. F. | 1,370 | 4 | ..... | Barbette turret, 11.8" | 1.5-2" | 16.0 | " " |
| Fuso..... | 3,717 | Armored cruiser | 3,500 | IV. 9.5" B. L. II. 6.8" B. L. | 1,460 | ... | Belt, 9-5.8" | 9-8" | ..... | 13.2 | " 1894, Japan. |
| Chiyoda..... | 2,450 | Armored cruiser | 5,600 | X. 4.72" R. F. | 480 | 3 | Partial belt, 4.8" | ..... | 2-1" | 19.0 | " 1890, " |
| Hiyei..... | 2,250 | Armored cruiser | 2,490 | III. 6.8" B. L. R. VI. 6.0" B. L. R. | 1,028 | 2 | Partial belt, 4" | ..... | ..... | 14.0 | " 1878, " |
| Naniwa..... | 3,650 | Protected cruiser | 7,235 | II. 10.2" B. L. R. VI. 6.0" B. L. R. | 1,499 | 4 | ..... | ..... | 2-8" | 18.9 | " 1886, " |
| Takachihō.... | 3,650 | Protected cruiser | 7,500 | II. 10.2" B. L. R. VI. 6.0" B. L. R. | 1,499 | 4 | ..... | ..... | 2-8" | 17.9 | " " " |
| Yoshino..... | 4,150 | Protected cruiser | 15,000 | IV. 6.0" B. L. R. VIII. 4.7" R. F. | 760 | 5 | ..... | ..... | 1.75" to 23.0 4.5" | ..... | " 1893, " |
| Akitsushima.. | 3,150 | Protected cruiser | 8,400 | IV. 6.0" B. L. R. VI. 4.7" R. F. | 670 | 4 | ..... | ..... | 2-3" | 19.0 | " 1894, Japan. |
| Akagi..... | 614 | Gun vessel | 700 | I. 8.2" B. L. R. I. 4.7" R. F. | 354 | ... | ..... | ..... | ..... | 13.0 | " 1890, " |
| Total, 11..... | 36,462 | | 66,025 | 12.6" = 3 10.2" = 4 9.5" = 4 8.2" = 1 6.8" = 5 6.0" = 26 4.72" = 59 | 11,886 | 34 | | | | | |
| | | | | Total.. 102 | | | | | | | |

from 1,000 to 5,000 yards. The Japanese admiral appears to have chosen the fighting distance, and he probably preferred the long range because he knew his ships, having most of them little or no protection, could not stand pounding, and he believed his gunners to be the better marksmen. The event seems to have justified his tactics.

Torpedoes appear to have played no part. If either fleet had been as much distressed as its adversary has represented, when night had fallen the victor might, with a few swift torpedo-boats, have finished under cover of the darkness the work of destruction. The fact that nothing of the kind was attempted is significant.

It is believed we have correctly the names of all the ships engaged, not counting torpedo-boats. If so, then the accompanying tables show accurately the nature and class of every vessel including armor, armament, when and by whom built, and every other essential.

It will be seen that the Japanese had of tonnage 36,462, the Chinese 32,915. The total weight of metal thrown at one discharge by the Japanese was 11,886 lbs., Chinese 14,135 lbs. The Chinese had eight 12-inch, four 10-inch, and one 10.2-inch guns, while the big guns of the Japanese were three 12.6-inch, four 10.2-inch, and four 9.5-inch. The heavy guns of the Chinese were all built in 1883-84, as were the vessels which carried them. The guns were good enough, however, to have sunk or disabled every ship in the Japanese fleet, unless by a bare possibility the armor of the "Fuso" could have resisted them at long range, if only they had thrown their projectiles accurately.

The three 12.6-inch guns of the Japanese were of the very best make, built in 1891. The Italians have and the English have a few 15-inch and 16-inch guns afloat, and our battle-ships are armed with 13-inch guns, but no nation is now beginning the construction of naval guns larger than 12-inch. A high-powered 12-inch gun is considered everywhere by experts equal to the requirements of a first-class battle-ship. The three 12.6-inch guns, one on each of the three largest Japanese ships, were all well protected by steel turrets 11.8 inches thick, and they had tubes, 9.8 inches thick, through which ammunition was hoisted. If these guns had sunk every ship in the Chinese line the fact would not have proven that armor such as is being put to-day

upon our battle-ships is useless or that it would not be worth in the day of battle every cent of its cost.

Turning from the guns to the armor with which the vessels of the two fleets were protected, the Chinese ship that had a belt of 8 inches from stem to stern left the fight, so far as we know, uninjured. So did the two ships "Chen Yuen" and "Ting Yuen," which had about 60 per cent. of their belts protected by armor from 14 to 8 inches thick, though the "Ting Yuen" had her large guns disabled. One of the two so-called armored ships having the least protection, the "King Yuen" and the "Lai Yuen," which had about 25 per cent. of their lengths covered with armor from 9.5 to 5.25 inches, was sunk, and the other was badly injured. The "Chih Yuen," "Chao Yung," and the "Yung Wei," which had no armor, were sunk.

Now, turning to the Japanese fleet, the only armored vessels they had were the "Fuso," with a complete belt from 9 to 5.8 inches thick, which was uninjured; the "Chioda," 60 per cent. of its length protected by a belt 4.6 inches thick, also uninjured; and the "Hiyei," with only 25 per cent. of its length belted with 4-inch armor, which was injured. The other injured vessels of the Japanese were the "Akagi," unprotected, and the "Matsushima," the flagship, which had no protection except for its one big gun.

Certainly there is nothing in these facts to induce the conclusion towards which so many writers seem to have been straining, that instead of battle-ships we should rely on cruisers as fighting-vessels; and yet the above is the substance of all that is known at this writing, October 10, about the battle off the Yalu that would enable us to judge of the efficiency of modern navies. Another table is inserted showing at a glance the nature and extent of armor on each vessel.

The truth is, so many wonders have been accomplished during the present century that we are perpetually on the lookout, expecting to be astonished; and nothing is now so attractive to the public as a sensational discovery that on some point, it matters not what, the world is all wrong, and the people who think they know and call themselves experts are simply a lot of ignorant pretenders.

When during the Chilian war the two torpedo-boats belonging to the Balmaceda Government sank the Blanco Encalada, quite a

number of writers began to contend that the torpedo-boat was to entirely supplant the battle-ship. But after a little thought and a modicum of inquiry it was ascertained that the torpedo-boats had simply done, under favoring conditions, what they were expected to accomplish—shown that they were to be useful implements of war. So when the lamentable accident to the “*Victoria*” occurred, the press was crowded with articles commending the ram as the chief weapon of battle-ship; but the discussion that followed soon developed the fact that the ram of the “*Camperdown*” had accomplished the purpose for which it was intended, sunk the vessel its ram came in contact with, that every well-designed modern ship of war is a ram, and that a battle-ship in addition combines every other known means of offence and of defence. It is not possible to say what changes may be wrought in its present features, but it is safe to predict that, while naval warfare shall remain, ships will be built with the view of taking their places in line of battle, and that such ships will never discard armor so long as it can be expected to afford protection against any considerable proportion of an enemy’s projectiles.

When we get all the possible facts from the Yalu action, though they need not be expected to abolish, they may yet help us to improve the battle-ship. One question of doubt is whether additional protection is not necessary to prevent the pieces of shells, exploding on the deck, from injuring the machinery below and even piercing the bottom of the vessel; this it is hoped to get light upon.

Another disputed point is as to whether it is safe to follow the general practice of extending the armor over what are called the vitals of the ship, and leaving the ends to rely upon compartments to keep the ship afloat. This practice is bitterly opposed by some of the best authorities. Naval experts will welcome the light, if any, that may be let in on this question.

But, however much or little the naval architect may get from Yalu, that battle carries one lesson our country must heed, viz.: that unless either China or Japan is to be wiped off the map as an independent nation, the United States are to have west of them two nations each steadily increasing its naval power, while our trade relations with both are rapidly becoming more intricate and more complicated.

HILARY A. HERBERT.